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PCT/GB99/02141MODULAR BUILDINGS

The present invention relates to modular buildings and more particularly to their structure, the method of their construction and interconnection.

It is well known to provide for portable modular building in circumstances where accommodation is needed in an emergency or on a temporary basis. Such buildings have to be rapidly and easily assembled to meet demand for emergency habitable structures in times, for example, of natural or other disasters. In addition such buildings are often required in remote locations by workers employed in the construction industry where temporary accommodation is needed during the term of the construction project.

There is a need for an all-purpose modular building system that can be exploited by both the residential and commercial construction sectors of industry. To date, portable and prefabricated buildings designs have not proved suitable for application in both sectors. Modular buildings have the advantages that they are easy and quick to erect, dismantle or relocate, are readily transportable, and flexible in that they are reconfigurable to meet changing requirements in size or needs. Unfortunately existing designs of such buildings are generally of a temporary nature and are not suited to long-term or permanent applications.

Existing modular buildings suffer from several disadvantages including: racking which causes wear and tear to the structure of the building and often leads to leaks, creaks and structural damage; condensation; inadequate interior temperature control; ineffective noise insulation; and an excessive ingress of dirt and dust (particularly in environments such as construction sites).

It is an object of the present invention to obviate or mitigate the aforesaid disadvantages and to provide for a modular building construction that has improved life expectancy so that it meets the requirements of more permanent structures whilst maintaining the benefits of its modular nature. The term "building module" is used hereinafter to refer to an inhabitable building block that can be used as living quarters, an office, a conference room, a lavatory or washroom or another room that forms part of a larger building structure.

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According to a first aspect of the present invention there is provided a modular building structure comprising a service module defining a plurality of connection nodes for connection to separate building modules, the service module containing apparatus for the supply and distribution of at least one mains service to the building modules, each building module being free-standing, pre-fitted for its intended use and connected to one of said connection nodes and to said supply of at least one mains service.

The modular structure of the present invention provides for a very flexible arrangement in that once the service module has been installed on site the building modules can then be connected thereto in the desired number and fashion. If there is a demand for more building modules these can be simply added without the need to lay further mains service supplies. Similarly, removal of a particular building module is also a simple operation. As the mains service supply is contained within the service module the need for preliminary ground excavation is eliminated. Moreover little or no foundations are required.

The service module is preferably in the form of a corridor walkway linking the building modules. The corridor may conveniently be provided with floor and ceiling cavities in which the mains service supplies are routed. Preferably one building module is a dedicated plant room that feeds the mains supply service to the service module.

The service module is preferably sectional so that it can be extended or shortened to provide more or less connection nodes as required. More than one service module may be provided and they may extend in transverse directions. The mains service may be electricity, waste disposal, air conditioning, water etc. In the case of waste disposal, each service module is provided with a holding tank and is connected to a lavatory or wash area of an adjacent building module. Preferably the holding tanks of adjacent sections of a service module are connected by a suction waste pipe. The arrangement eliminates the need for gravity operated waste disposal. In the case of air conditioning each service module is preferably fitted with a heat exchanger and has an external pump for evacuation of warm air. Each building module also has its

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own heat exchanger that is connected to the pump and heat exchanger of the adjacent service module.

Preferably each adjoining pair of building modules or service modules have apparatus for connecting adjacent modules, the apparatus comprising a housing defining apertures that extend into the structure of each module and a flexible resilient insert that is received in each aperture and bridges the two modules, the insert being supported on a fixing element that is secured to each of the modules.

According to a second aspect of the present invention there is provided a method for constructing a modular building structure, the method comprising the steps of: preparing a site on which the building structure is to be located; installing a service module on the prepared site, the service module defining a plurality of connection nodes for connection to separate building modules; installing at least one mains supply service to the service module; connecting at least one pre-constructed building module to a connection node and connecting it to the mains supply service of the service module.

According to a third aspect of the present invention there is provided an apparatus for connecting adjacent building modules, the apparatus comprising a housing defining an aperture that extends into the structure of at least one building module and a flexible resilient insert attached to adjacent module, the insert being that is received in the aperture and supported on a fixing element that is secured to said adjacent building module.

The housing preferably further comprises an access chamber that is open to the inside of the building module so as to facilitate insertion of the fixing element and flexible insert.

Preferably the apparatus for connecting adjacent building modules is disposed in a floor or ceiling cavity of the building module.

Specific embodiments of the present inventions will now be described, by way of example only, with reference to the accompanying drawings in which:

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